Renal and Urological Sciences Integrated Review Group

The Renal and Urological Sciences (RUS) Integrated Review Group (IRG 20) will review grant applications to investigate systemic or local diseases affecting the kidney, urinary tract, and male genital system. This includes clinical, translational and fundamental studies of the disease state and its treatment as well as of normal growth, development, structure, and function.

Specifically, the RUS IRG will review applications directed at understanding: 1) genetic, cellular and molecular mechanisms underlying regulation of fluid and mineral balance in the intact kidney and in the diverse cells composing the kidney; 2) pathogenesis of hypertension as it affects the kidney; 3) effects of hormonal functions on the kidney as a whole, normal and abnormal hormonal regulation of kidney and male sexual functions; 4) causes and treatment of acute and chronic disorders that affect the kidney, urinary tract, and male genital system (including sexual dysfunction); and 5) pathogenesis of local or systemic disorders affecting the structure or function of the kidney, urinary tract (including the pelvic floor), or the male genital system. In addition, the RUS IRG will review applications aimed at: 1) development and evaluation of new techniques for investigating disorders of the kidney, urinary tract, and male genital system; 2) development and evaluation of therapies to treat localized or systemic disorders arising from damage to the kidney, urinary tract, or male genital system; 3) translation of basic research to clinical investigation; and 4) treatment of disorders of the kidney, urinary tract, and male genital system.

To that end, the following three study sections are proposed:

- Cellular and Molecular Biology of the Kidney (CMBK)
- Pathobiology of Kidney Disease (PBKD)
- Urologic and Kidney Development and Genitourinary Diseases (GKDD)

Cellular and Molecular Biology of the Kidney (CMBK)

The CMBK Study Section reviews grant applications involving basic and applied aspects of normal and abnormal renal physiology, cell biology, transport biology, hormone action and signal transduction, vascular biology, genetic disorders, cell matrix interactions, biophysics, and bioenergetics.

Specific Areas covered by CMBK:

- Molecular biology and physiology of transport systems (e.g., water channels, cotransporters, organic solutes, and ion channels) broadly relevant to renal function and disease; structure-function relationships; regulation of function; synthesis and degradation of cellular components; and disorders of transport function, both acquired and inherited.

- Protein trafficking and cell polarity; protein turnover and targeting; cell-matrix interactions; protein synthesis; and regulation of gene expression and other processes relevant to the function of renal tubular epithelial, vascular, and interstitial cells.

- Disorders of tubular epithelial and endothelial cells as they relate to kidney diseases.

- Identification and characterization of genes that cause kidney diseases in humans and animal models. Pathophysiology and cellular and molecular consequences of genetic disorders (including polycystic kidney disease and disorders of tubular function).

- Integrated aspects of disordered fluid, electrolyte, and acid-base homeostasis resulting from abnormalities in the transport systems; blood pressure and extracellular fluid volume homeostasis; hormonal and autocoid regulation of renal and urinary tract function; neural regulation; and abnormal transport systems causing hypertension.

- Pharmacology relating to kidney function.

Areas of Shared Interests Within the RUS IRG:

With PBKD:
Hypertension: Proposals related to the effects of hypertension or the hemodynamics of hypertension could be reviewed by PBKD. Proposals that focus on 1) the genetics of renal hypertension or vascular regulation or 2) cell physiology, transport, or channel abnormalities contributing to the development of hypertension, could be reviewed by CMBK.

Genetic diseases. Proposals related to organ physiology and consequences of genetic diseases could be reviewed by PBKD. Also, studies that relate to alterations in the structure or function of the glomerulus could be reviewed by PBKD. Proposals related to genetic diseases affecting renal tubular epithelial cells, as well as those studying effects on the structure or function of affected proteins, could be reviewed by CMBK.

Normal structure and function of the glomerulus and its constituent cells. Where the focus is on understanding how genetic mutations or polymorphisms affect structure and function (e.g., Alport's hereditary nephritis, hereditary forms of nephrotic syndrome, Denys-Drash syndrome, and Fraser syndrome), the application could be reviewed by PBKD. Studies to identify candidate genes or define disease-modifying polymorphisms could be reviewed by CMBK. In addition, studies of glomerular cells that involve primarily signal transduction pathways would be more appropriate for CMBK.

Proteinuria and nephrotic syndrome. Studies of the pathogenesis of proteinuria and clinical studies of nephrotic syndrome could be reviewed by PBKD, whereas studies of integrated handling of renal salt and water excretion in the pathogenesis of edema could be reviewed by CMBK.

Progression of renal disease. Applications dealing with factors that influence the progression of disease or organ pathophysiology, whether clinical or in experimental models, are most appropriate for PBKD. Those that address cell physiology, including cell signaling, trafficking, polarity, transport or channel properties could be reviewed by CMBK.

Diabetic nephropathy. Applications dealing with factors that influence the susceptibility to diabetic nephropathy, its initiation, progression, and pathophysiology (whether clinical or involving *in vivo* or *in vitro* experimental models) are most appropriate for PBKD. Those that address cell physiology (including cell signaling, trafficking, polarity, transport or channel properties) could be reviewed by CMBK.

Pathogenesis and manifestations of cystic kidney disease. Clinical and basic studies of the effects of cystic diseases on renal function could be reviewed by PBKD. Molecular and clinical genetic studies in humans and animal models are more appropriate for CMBK as are studies of the transport properties of cystic epithelia.

With GKDD:
Stone disease: Proposals related to pathogenesis of stone formation, the effects of stones, and its treatment could be reviewed by GKDD. Proposals related to abnormal transport systems and membrane biology related to stone formation could be reviewed by CMBK

Areas of Shared Interests With Other IRGs:

Molecular Approaches to Cell Function and Interactions (IRG 3): Proposals related to general questions of epithelial cell biology with no apparent application to the kidney and its function could be reviewed by IRG 3. Proposals related to questions of cell biology related to renal function and disease could be reviewed by CMBK. Studies of the pathophysiology of renal cyst development may involve molecular and cell biological components and considering the substantial expertise in cell and molecular biology in CMBK, such studies could be reviewed by CMBK to integrate the unique nature of cystic kidney diseases.

Fundamental Genetics and Population Biology (IRG 4): Proposals related to genetics of systemic diseases could be reviewed by IRG4. Proposals related to genetic diseases affecting kidney epithelial cells and the cell and molecular physiology of affected proteins (including polycystic kidney disease) could be reviewed by CMBK.
.
Cardiovascular Sciences (IRG 15): Proposals related to non-renal aspects of hypertension could be reviewed by IRG 15. Proposals related to the molecular actions of disorders causing abnormal function of ion channels, resulting in hypertension, could be reviewed by CMBK.

Pathobiology of Kidney Disease (PBKD)

The Pathobiology of Kidney Disease (PBKD) study section reviews grant applications involving basic and clinical studies of kidney disease. This includes investigations of pathophysiology, diagnosis, consequences and treatment of acute and chronic disorders of the kidney, the consequences of kidney disease and failure, as well as studies of the normal structure and function of the glomerulus. Studies may involve *in vivo* or *in vitro* models or patient-focused investigations.

Specific areas covered by PBKD

- Normal structure and function of the glomerulus and its constituent cell*s*: including normal cell biology of glomerular cells, composition and assembly of the glomerular basement membrane, cell-matrix interactions, and regulation of glomerular filtration and permeability.

- Immune and non-immune disorders of the glomerulus and tubulo-interstitium: including kidney-specific autoimmunity and renal manifestations of systemic autoimmune diseases, glomerulonephritis, non-inflammatory glomerulopathies, identification of nephritogenic antigens and antibodies, nephropathic cell-mediated

immunity, and the role of inflammatory mediators and inflammatory cell infiltrates in the kidney.

- Proteinuria and nephrotic syndrome: including mechanisms and mediators of proteinuria as well as the pathophysiology of nephrotic syndrome and its consequences.

- Mechanisms of renal fibrosis and scarring: including post inflammatory fibrogenesis and the roles of proteinuria, ischemia, inflammatory mediators and immune mechanisms.

- Progression of renal disease: including risk factors and mechanisms of disease.

- Mechanisms and consequences of acute renal failure: including endothelial and epithelial cell injury, repair, and regeneration; contribution of inflammation; and mechanisms of cell death following ischemic injury and other forms of tubular epithelial injury.

- Toxic injury to the kidney: including xenobiotic-mediated alterations in renal signal transduction, cell-cycle regulation, receptors, genes, and apoptosis; as well as mechanisms of renal apoptosis and necrosis, senescence, genotoxic responses, DNA damage, oxidative stress, and cellular aging.

- Renal hemodynamics: including the regulation of the renal microcirculation and the hormonal regulation of renal circulatory function.

- Role of the kidney in the regulation of blood pressure and in the development of hypertension: including hormonal and autocoid factors that regulate integrated functions of the kidney, including: renal hemodynamics; neural influences on the kidney; the renin-angiotensin system; and the expression of effects of nitric oxide, endothelin, and other such factors.

- Effects of hypertension on the kidney: including experimental and clinical studies of the pathophysiology, course, and treatment of hypertensive nephrosclerosis.

- Vascular biology of the kidney. This includes renal vascular endothelial cell injury, dysfunction and involvement in inflammation, renovascular hypertension, and leukocyte homing to the renal microvasculature.

- Studies on basic and clinical aspects of kidney ablation: including experimental models and mechanisms of allograft rejection/tolerance, mechanisms of action of immunosuppresion, biomarkers, immunogenetics, chronic allograft nephropathy, prevention and/or treatment of complications, and immunoregulatory protocols for prevention and/or treatment of rejection.

- Identification of biomarkers in renal disease**:** including both genomic and proteomic approaches.

- Diabetic nephropathy.

- Pathogenesis and manifestations of cystic kidney disease.

- Complications and management of uremia: including renal replacement therapies (including dialysis), the pathogenesis and consequences of abnormalities of the vascular or peritoneal access for dialysis therapy, metabolic and nutritional consequences of kidney disease (including those leading to uremic manifestations), and acquired cystic diseases.

- *In vitro* and animal models that investigate the molecular basis of "gene-environment" interactions related to the renal system focused on putative environmental susceptibility genes, and toxicogenetics.

Shared Interests Within the RUS IRG:

With CMBK:
Normal structure and function of the glomerulus and its constituent cells. Applications to identify candidate genes or define disease-modifying polymorphisms could be reviewed by CMBK. In addition, studies of glomerular cells that involve primarily signal transduction pathways would be more appropriate for CMBK. Where the focus is on understanding how genetic mutations or polymorphisms affect structure and function (e.g., Alport's hereditary nephritis, hereditary forms of nephritic syndrome, Denys-Drash syndrome, and Fraser syndrome), the application could be reviewed by PBKD.

Proteinuria and nephrotic syndrome. Studies of renal salt and water handling in the pathogenesis of edema could be reviewed by CMBK, whereas studies of the pathogenesis of proteinuria and clinical studies of the metabolic and nutritional consequences of the nephrotic syndrome could be reviewed by PBKD.

Progression of renal disease. Applications that address cell physiology, including cell signaling, trafficking, polarity, transport or channel properties could be reviewed by CMBK. Those dealing with factors that influence the progression and whole organ pathophysiology, whether clinical or in experimental models are most appropriate for PBKD.

Renal hemodynamics. Hypertension resulting from, or causing, changes in cell physiology, transport, or channel abnormalities contributing to the development of hypertension could be reviewed by CMBK. Applications that focus on the genetics of renal hypertension or its influence on vascular cells (endothelial and smooth muscle cells) in the kidney leading to abnormal vascular regulation could be reviewed by CMBK. Proposals related to the effects of hypertension on the kidney or changes in hemodynamics related to hypertension, could be reviewed by PBKD.

Identification of biomarkers in renal disease. Proposals related to the molecular nature of proteins causing renal disease and its relationship with epithelial cells could be reviewed by CMBK. Studies of biomarkers derived from the kidney to inform understanding of the diagnosis/treatment of kidney diseases as well as those related to genetic disorders of the glomerulus and blood vessels could be reviewed by PBKD.

Diabetic nephropathy. Applications dealing with cell physiology, including cell signaling, trafficking, polarity, transport or channel properties could be reviewed by CMBK. Those that address factors that influence the susceptibility to diabetic nephropathy, its initiation,

progression, and pathophysiology (whether clinical or in *in vivo* or *in vitro* experimental models) are most appropriate for PBKD.

Pathogenesis and manifestations of cystic kidney disease. Molecular and clinical genetic studies in humans and animal models are more appropriate for CMBK as are studies of the transport properties of cystic epithelia. Clinical and basic studies of the effects of cystic diseases on renal function could be reviewed by PBKD.

With GKDD:
Complications of kidney transplantation. Applications addressing post-transplant obstructive complications, bladder reconstruction, or other urological issues could be reviewed by GKDD. Problems of divalent ion metabolism and stone formation following renal transplantation could also be reviewed by GKDD.

Studies of diseases affecting the lower urinary tract. In general, these studies will be reviewed by GKDD, except when the lower urinary tract is involved in a disorder affecting the kidney, and for which PBKD has specific expertise (e.g., vasculitic syndromes, systemic lupus erythematosus).

Shared Interests With Other IRGs:

Immune and non-immune disorders of the glomerulus and tubulo-interstitium. Molecular Approaches to Cell Function and Interactions IRG (IRG 3) and Immunology IRG (IRG 10) Studies of autoimmunity and humoral and cellular immune responses involving the kidney and urinary tract could be reviewed by PBKD. These include clinical and animal studies of glomerulonephritis, interstitial nephritis, lupus nephritis and vasculitic syndromes as they affect the kidneys and urinary tract. Immunological events leading to autoimmunity are more appropriate for IRG 10. There is also potential overlap with IRG 3 regarding the cell and structural biology of glomerular cells and their interaction with extracellular matrix. When this is relevant to glomerular structure and/or function, the applications would be best reviewed by PBKD.

Mechanisms of renal fibrosis. Molecular Approaches to Cell Function and Interactions IRG (IRG 3) and Immunology IRG (IRG 10) Fibrosis and scarring following immune and non-immune forms of cell and tissue injury and inflammation are universal phenomena and could potentially be reviewed by IRG 10 or IRG 3. However, fibrosis of the renal interstitium resulting from glomerular and/or tubular diseases is likely to be the result of pathogenic processes unique to the kidney, such as the development of proteinuria and renal tubular cell injury, and could, therefore, be reviewed by PBKD.

Mechanisms and consequences of acute and chronic renal failure. Cardiovascular Sciences IRG (IRG 15); and Surgical Sciences, Biomedical Imaging, and Bioengineering IRG (IRG 21) Applications that consider a variety of blood vessels, but do not focus on kidney vessels or cells, could be reviewed by IRG 15. However, given the extensive cell-cell interactions that determine functional alterations resulting form both acute and chronic events in the kidney, PBKD could review proposals dealing with functional changes. Proposals addressing vascular problems of proliferation, and vascular problems in general, could be reviewed by IRG 15. Studies primarily dealing with surgical outcomes, or applied radiologic imaging could be reviewed by IRG 21. Applications to investigate the vascular biology of renal vessels (renal arteries, their tributaries, afferent and efferent glomerular arterioles vasa recta, and

glomerular capillaries) could be reviewed by PBKD. Applications that consider problems related to vascular access for hemodialysis could be by PBKD.

Proteinuria and nephrotic syndrome. Molecular Approaches to Cell Function and Interactions IRG (IRG 3), Health of the Population (IRG 7), Hematology (IRG 14), Cardiovascular Sciences (IRG 15), and Endocrinology, Metabolism, Nutrition and Reproductive Sciences (IRG 16) Potential overlap exists with IRG 3 with regard to the development of proteinuria, which may involve alterations in the biology of glomerular cells and/or cell-matrix interactions. Considering the unique nature of the glomerular basement membrane and glomerular cells, and the relationship between altered structure and function of the glomerulus, such studies could be reviewed by PBKD. There is also overlap with other IRGs with regard to the metabolic complications of the nephrotic syndrome. Studies directed at the mechanisms of hypercoagulability, hyperlipidemia, atherogenesis and cardiovascular risk factors could be reviewed by IRG 14, IRG 16, IRG 15 or IRG 7, respectively.

Role of the kidney in the regulation of blood pressure and in the development of hypertension and effects of hypertension in the kidney. Cardiovascular Sciences IRG (IRG 15) Applications to study the physiology of blood pressure regulation that do not involve the kidney or renal hormones and studies that address vascular or other systemic aspects of hypertension, with a limited or absent focus on the kidney, may be reviewed by IRG 15.

Vascular biology of the kidney. Cardiovascular Sciences IRG (IRG 15) Studies related to the vascular biology of renal vessels (renal arteries, their tributaries, afferent and efferent arterioles, and glomerular capillaries) could be reviewed by PBKD. Studies that consider a variety of blood vessels, but do not focus on renal vessels or cells in the kidney, could be reviewed by IRG 15.

Toxic injury to the kidney. Molecular Approaches to Cell Function and Interactions IRG (IRG 3) and Cardiovascular Sciences (IRG 15) Proposals dealing with toxin-mediated, acute or chronic cell injury within the kidney, regardless of the type of cell, could be reviewed by PBKD. However, potential overlap exists with IRG 3 regarding cellular and molecular aspects of toxin uptake, trafficking, and the resulting cellular alterations. However, given the complex cell-cell interactions within the kidney, proposals addressing the pathology or functional aspects of such toxins could be reviewed by PBKD. Use of toxins to probe cellular activities, such as membrane transport or trafficking or to determine the function of cellular organelles could be directed to IRG 3 unless they specifically deal with the physiology and/or cell biology of cells or cellular functions of the kidney (e.g., proton secretion, water transport, etc.) In addition, toxin-mediated injury of endothelial cells in general, not restricted to the kidney, could be reviewed by IRG 15.

Studies of basic and clinical aspects of kidney transplantation. Immunology IRG (IRG 10) and Surgical Sciences, Biomedical Imaging, and Bioengineering IRG (IRG 21) IRG 21 would best review surgical aspects of transplantation and issues involving recovery of organs for transplantation and organ preservation. Investigations of chronic allograft nephropathy related to immunologic and non-immunologic factors and specific medical, pharmacological and immunologic aspects of transplantation of the kidney could be reviewed by PBKD. There is also shared interest with IRG 10, which would be best suited for reviewing general principles of transplantation (e.g., rejection/tolerance) and aspects of organ and cell transplantation that are common to different organs. There is a scientific advantage to divide transplantation applications into several study sections. Firstly, it would promote diversity in the approach to this problem, which has not been solved over many decades. Secondly, it

would promote the investigation of organ-specific factors plus non-immunological influences of organ function as well as immunological events. Applications dealing with general principles of transplantation (e.g., rejection/tolerance) could be reviewed in the Immunology IRG (IRG 10), but applications with direct implications for kidney transplantation be reviewed in the by the PBKD Study Section. Members of PBKD study section will have expertise in immunopathology, clinical nephrology, and transplantation; and could provide review of clinical and experimental studies of kidney transplantation, as well as many experimental studies that use orthotopic cardiac allografts as a model system.

Identification of biomarkers in renal disease. Surgical Sciences, Biomedical Imaging, and Bioengineering IRG (IRG 21) Studies of biomarkers derived from the kidney to inform understanding and diagnosis/treatment of kidney diseases could be reviewed by PBKD. Studies of markers of function, such as might be developed for the radiological diagnosis of distribution of renal blood flow or epithelial cell function, could be reviewed by IRG 21.

Diabetic nephropathy. Endocrinology, Metabolism, Nutrition and Reproductive Sciences (IRG 16) Applications dealing with factors that influence the susceptibility to diabetic nephropathy, its initiation, progression and pathophysiology (whether clinical or in *in vivo* or *in vitro* experimental models) are most appropriate for PBKD. Applications that focus on extra-renal manifestations of diabetes (with only minor aspects of the research concerning nephropathy) could be reviewed by IRG 16. Basic and clinical studies of the metabolic or nutritional complications arising from kidney disease and leading to manifestations of uremia could be reviewed in PBKD.

Complications and management of uremia. Hematology (IRG 14); Cardiovascular Sciences (IRG15); Endocrinology, Metabolism, Nutrition and Reproductive Sciences (IRG16); Musculoskeletal, Oral and Skin Sciences (IRG 17); and Surgical Sciences, Biomedical Imaging, and Bioengineering IRG (IRG 21) Studies of extracorporeal therapies for renal disease may have shared interests with IRG 21. Applications that focus on hemodialysis, peritoneal dialysis, and dialysis access could be reviewed by PBKD. In addition, PBKD reviews applications that involve basic and clinical studies of the complications of decreased renal function and manifestations of uremia. The spectrum of effects of decreased renal function includes a comprehensive list of major organ abnormalities (particularly hematologic, cardiovascular, metabolic and nutritional abnormalities). Therefore, interest in studies of these abnormalities will be shared with IRGs 14, 15, 16, and 17). Studies that focus on defects due to abnormalities in renal function are best reviewed by PBKD.

Urologic and Kidney Development and Genitourinary Diseases (GKDD)

The Urologic and Kidney Development and Genitourinary Diseases (GKDD) study section reviews grant applications concerning normal and abnormal development of the kidney, urinary tract, and male genital system and physiologic and pathophysiologic processes of cells and tissues of the bladder, prostate, ureter, urethra, male reproductive organs, penis and male and female pelvic floor. This encompasses: 1) responses of uroepithelial tissues and cells to infectious bacteria and other pathologic insults; 2) mechanisms of renal stone formation and prevention; 3) normal development of the kidney, urinary tract, and male genital system; 4) normal and pathophysiological processes of the urinary tract and male genital system; 5) application of new technologies and methodologies to the diagnosis and treatment of urologic diseases; 6) novel approaches to regeneration and tissue engineering of the kidney, urinary tract and male genital system; and 7) clinical assessment of diseases

of the urinary tract and male genital system, including urinary incontinence and pelvic floor dysfunction.

Specific areas covered by GKDD

- Responses to, and consequences of, microbial infection and inflammation in the urinary tract and male genital system. This includes proposals to elucidate the molecular and epidemiologic basis of acute and recurrent urinary tract infections. Included are studies that focus on: 1) understanding the mechanism by which urinary tract cells and tissues inflammatory processes of the urinary tract and male genital system relate to disease; and 2) understanding the molecular and cellular consequences of host-pathogen interactions (including *E. coli* and other microbial pathogens) and inflammatory processes in the urinary tract including angiogenesis, signaling pathways, apoptosis, and innate immune responses. Diseases include urinary tract infection, interstitial cystitis, prostatitis, pyelonephritis, local inflammatory responses to tumors, and inflammation related to immuno-therapy of neoplasia.

- Development, cell growth, differentiation, aging, and neoplasia in the kidney and the urinary tract and male genital system. This area includes: genetic and environmental mechanisms controlling growth, differentiation, and development (including the embryonic origin, commitment, differentiation, and fate) of all cell types in the kidney, urinary tract, and male genital system; cell and tissue interactions that regulate organ development; inductive mechanisms of tissue and organ development; lineage determination; pattern formation; morphogens, cytokines, hormones, and cell cycle mechanisms that control normal and abnormal growth and differentiation; nuclear and mitochondrial mechanisms responsible for aging; and signals underlying senescence.

- Divalent ion metabolism/stones. This area relates to mechanisms of stone formation (including metabolic dysregulation, etiologic agents and divalent cations); natural inhibitors of stone formation; stone detection, treatment and prevention; and effects of stone treatment on cells of the kidney, urinary tract, and male genital system.

- Function and dysfunction of the bladder, ureter, and urethra. This includes: basic and preclinical studies of hypertrophic muscle growth; contractile dysfunction; effects of aging; prostatic hyperplasia and obstruction; pediatric conditions (such as posterior urethral valve disorders, obstructive uropathy, vesico-ureteral reflux and bladder exstrophy); pelvic pain syndromes; neurogenic syndromes; spinal cord influences on bladder function and feedback regulation; cell and tissue interactions; and signal transduction mechanisms as they relate to urologic diseases or conditions.

- Function and dysfunction of the prostate. This includes: basic and preclinical studies of the relationship between pre-neoplastic conditions and frank neoplasia; development and progression of benign prostatic hyperplasia; stroma-epithelial interactions and cell signaling; signal transduction mechanisms as they relate to prostate cell growth and survival (including steroid-mediated signaling mechanisms); and cell-matrix interactions.

- Incontinence and pelvic floor dysfunction. This area relates to the problems of urinary incontinence and pelvic organ prolapse and organ, tissue, cellular, and molecular mechanisms affecting incontinence and pelvic organ function. It includes studies of: normal structure, function and biomechanics as applied to the urethra, bladder and

their supporting tissues. Studies of smooth and striated muscles, connective tissue, and nerves supplying the pelvic floor are considered relevant, as are studies of normal development, injuries sustained during childbirth, and deterioration that occurs with age and disease.

- Male reproductive tract. This area includes basic and clinical studies related to normal and abnormal function of the testis, epididymis, *vas deferens*, and seminal vesicles. Studies of the effects of disease, environment, and pharmacologic agents on these organs are included.

- Sexual dysfunction. This area includes basic and preclinical studies of both female and male normal sexual function and dysfunction (e.g., erectile dysfunction or anorgasmia) as well as the effects of: disease (such as diabetes and cardiovascular disease), toxic environments (e.g., cigarette smoking), and licit and illicit drugs on sexual function.

- Cell and gene therapy of the kidney, urinary tract, and male genital system. This area includes technologies, animal models, and human studies that utilize cell and gene therapy to alter or repair abnormal functions of the kidney, urinary tract, and male genital system.

- Regeneration and tissue engineering of the kidney, urinary tract, and male genital system. This area includes: 1) stem cell biology and cellular therapeutics as they relate to the kidney, urinary tract, and male genital system (including differentiation of embryonic and adult stem cells into the various kidney, urinary tract, and male genital system cell types); 2) artificial scaffolding, biopolymers, and vector systems to generate specific tissues and/or organs, epithelial and vascular repair and remodeling in response to injury; and 3) novel cell and gene therapies.

- Clinical research and outcomes. This includes: 1) investigator-initiated clinical trials and other human research studies that involve urologic diseases and disorders and 2) health services research studies of urologic diseases (such as database development and studies, clinical trial outcome studies, health-economic studies, and demographic studies).

- Application of novel technologies to studies of the urinary tract and male genital system. This includes the application of new technologies (including proteomics, microarrays and nanotechnology) to characterize disease states; develop and validate new clinical, diagnostic, or prognostic tests; and evaluate treatment outcomes.

Shared Interests Within the RUS IRG:

With PBKD:
Complications of kidney transplantation. Problems of divalent ion metabolism and stone formation following renal transplantation would be best reviewed by PBKD. Applications designed to resolve post-transplant obstructive complications, bladder reconstruction, or other urological issues could be reviewed by GKDD.

Studies of diseases affecting the lower urinary tract. In general, these studies will be reviewed by GKDD, except when the lower urinary tract is involved in a disorder affecting the kidney, and for which PBKD has specific expertise (e.g., vasculitic syndromes, systemic lupus erythematosus).

With CMBK:
Stone disease: Proposals related to abnormal transport systems and membrane biology related to mineral balance could be reviewed by CMBK. Proposals related to pathogenesis of stone formation, the effects of stones, and its treatment could be reviewed by GKDD.

Shared Interests With Other IRGs:

Biology of Development and Aging (IRG 5) Studies that focus on the development or aging of normal urologic or renal systems or are related to a specific disease of the kidney, urinary tract, or male genital system could be reviewed by GKDD. Studies that use urologic or renal tissue to investigate a specific cellular mechanism that can be generalized to other cells or organs could be reviewed by IRG5. Proposals related to general issues of development and aging could be reviewed by IRG 5. Proposals related to the membrane biology of renal development and aging could be reviewed by GKDD.

Infectious Diseases and Microbiology (IRG 11) Studies of microbial genetics, bacteriology and investigations focused on urologically pathogenic microbes could be reviewed by IRG1. Basic and clinical studies focused on understanding the consequences of host-pathogen interactions and how they relate to outcome, clinical syndromes, or host responses could be reviewed by GKDD.

Oncological Sciences (IRG 13) Investigation of malignant transformation and progression focused on mechanisms applicable to neoplastic processes in general, could be reviewed by IRG13. Applications focused on malignant transformation or progression in the context of urinary tract or kidney development or disease, or comparisons of benign and malignant cells of kidney, urinary tract, or male genital system for the purpose of understanding normal or benign processes in these organs could be reviewed by GKDD. In addition, certain genes and their products are involved in both neoplastic and developmental process (e.g. WT1 and VHL). Therefore, certain applications that focus on the role of such genes on kidney or urogenital gene regulation, or on normal or abnormal development of the kidney, urinary tract, or male genital system would be best reviewed by GKDD.

Endocrinology, Metabolism, Nutrition and Reproductive Sciences (IRG 16) Studies of the basic mechanisms of hormone action, cellular metabolism, or male spermatogenesis, could be reviewed by IRG16. Studies of the mechanism of action of hormones on urologic or renal development or diseases of the urinary tract and male genital system could be reviewed by GKDD.

Musculoskeletal, Oral and Skin Sciences (IRG17) Basic research studies of the development or mechanism of action of bone, muscle and connective tissue could be reviewed by IRG17. Studies of the role of bone, muscle and connective tissue in normal or pathological states of the urological system could be reviewed by GKDD.